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(56) Documents Cited

GB 2253377 A

GB 2166692 A

GB 0405568 A

US 4695087 A

US 3891102 A

US 3792894 A

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(54) Apparatus to permit carriage of pallets or containers above a load platform

(57) A load carrying platform 10, particularly of a vehicle, carries at least two spaced apart rows of spaced apart vertical struts 12, 14, filled with load supporting members 16, 18 which, in use, are positioned substantially horizontally above the platform. The load supporting members can support a pallet or container above the platform so as to permit another pallet or container to be carried on the platform therebelow. The load supporting members can be positioned substantially clear of the platform area when not in use, folding up to position 23, thus facilitating access to the platform during loading and unloading operations.

The top half 30 of each strut may be folded down to position 31 to engage with the next vertical strut, to improve the rigidity of the load supports.

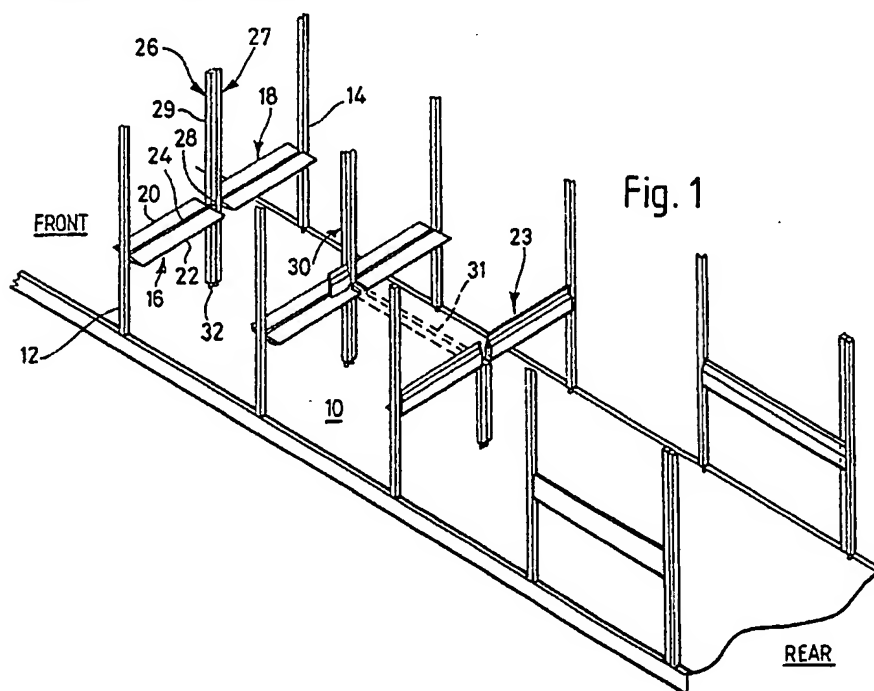
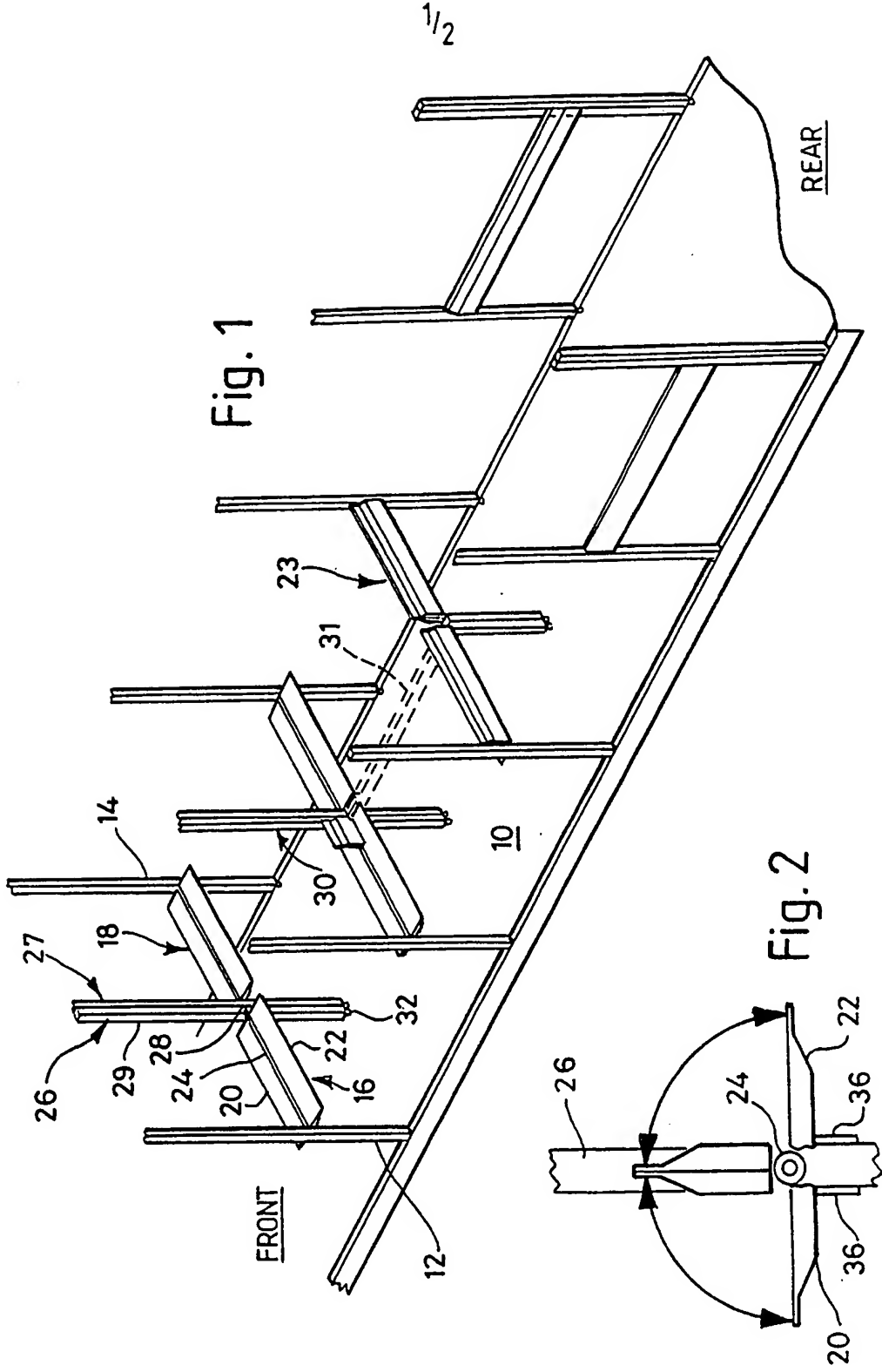


Fig. 1



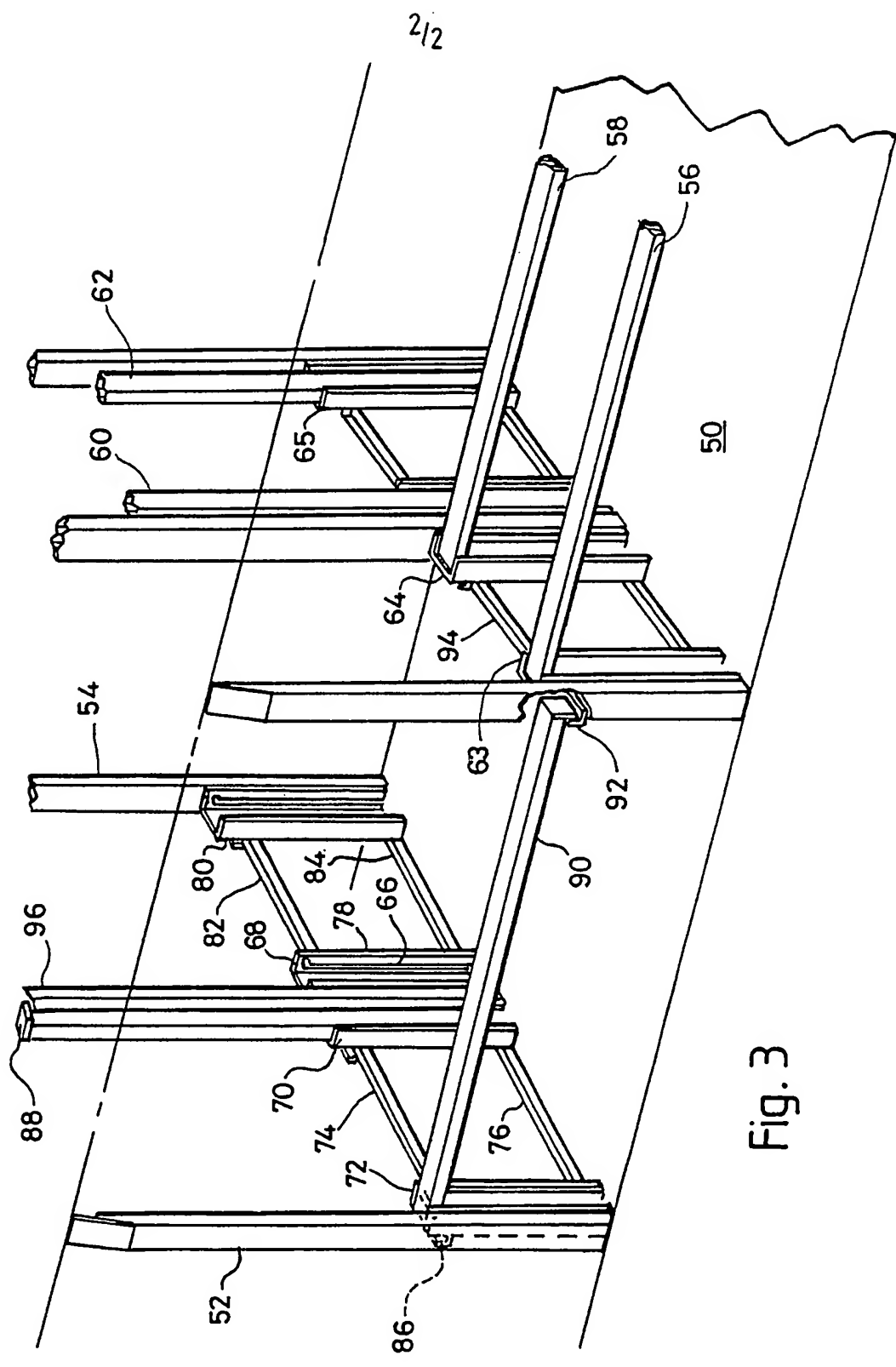


Fig. 3

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Title: Improvements in or Relating to the Arrangement  
of Loads

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Field of the Invention

This invention relates to apparatus for arranging loads on load bearing platforms, particularly loads in transit and methods of arranging such loads, and is applicable to trailers vans, aircraft, hovercraft, ships, railway wagons and the like.

Background to the Invention

It is common to store or transport goods or produce in containers of regular size and shape or to support the goods or produce on pallets of regular size and shape.

It is frequently difficult, or even impossible, to store or transport containers or pallets on top of each other, as the pallets may be unstable or because the containers are not of sufficient strength and rigidity to permit loading one above another.

The problem can be overcome by providing a mezzanine floor between the layers of pallets or containers. However, such a fixed support presents an obstacle to the loading and unloading of the pallets or containers, particularly to or from, a vehicle.

It is therefore an object of the present invention to provide means for storing an upper layer of containers or pallets above a lower layer thereof without requiring a fixed intermediate floor.

#### Summary of the Invention

According to one aspect of the present invention, apparatus for installation upon a load carrying platform comprises:-

at least two spaced apart rows of spaced apart substantially vertical struts, having load supporting members thereon which, in use, are positioned substantially horizontally above the platform thereby to support a pallet or container above the platform so as to permit another pallet or container to be carried on the platform therebelow at least part of the weight of the upper pallet or container being borne by the respective strut(s) and which, when not required to support a pallet or container, may be positioned substantially clear of the parts of the platform area over which the load supporting members are positioned in use.

The container may be a box, cage or any other packaging or containing means.

References to pallets hereinafter shall also be intended to refer to containers, where the context allows.

Preferably one row of vertical struts is provided along each of two opposed sides of the platform, wherein the struts of one row are substantially directly opposite the struts of the other row, and can therefore be considered

to be arranged in pairs.

The load supporting members may, in use, extend transversely across the platform or in a direction from front to back (or back to front).

It is a preferred feature that, when not required to support a pallet, the load supporting members can be re-positioned so as substantially not to obstruct movement of any remaining pallets and substantially not to obstruct access to the platform.

The load supporting members may be re-positioned in a number of ways to facilitate access to remaining pallets or to the platform.

The load supporting member may include flaps, which may be hingeable, to provide additional area for engaging the underside of the pallets or containers.

In one embodiment, the load supporting members may be pivoted upon the vertical struts, such that they may be swung through substantially a right angle, from a position in which they extend generally transversely across the platform to a position in which they extend generally vertically in line with the vertical struts to which they are pivotally attached.

In another more preferred embodiment the supporting members may be pivoted in the horizontal plane on or about the vertical struts, such that when not required the supporting members may be swung into general alignment with the edges of the platform and generally in line with the lines of struts therealong.

The separation between rows of vertical struts may be such that in the horizontal position, the opposed supporting members from each pair of struts may overlap or just meet and make contact to form a junction, or may fall short of making contact, when they are swung across the platform.

A further row of vertical struts may be provided on the platform positioned between the rows of struts along the edge thereof to provide further support for the load supporting members. These additional vertical struts may also be re-positioned when not required.

Generally the further row of vertical struts is centrally positioned between the two outer rows of vertical struts along the edges of the platform.

It is a preferred feature of the invention that the central vertical struts are collapsible. Typically therefore the central struts are hinged so that an upper part thereof can be pivoted in a vertical plane, from the vertical, to the horizontal, so as to extend parallel to the platform.

The hinge point is preferably located above the point of attachment of the load supporting member(s) to the strut, such that in use there is a "fixed" portion of the collapsible strut which supports the end of the load supporting member(s), and a hingable portion which is free to swing down.

Preferably the separation of the struts in the central row and the length of the hingable portions, are such that the latter will just extend, when horizontal, between one

vertical strut and the next in the central row, so as just to make contact with an adjacent strut.

It is most preferable that the hingable portion of each such strut can be retained in the horizontal position by retaining means, such as a pin, a clip, bracket or other device which may be spring loaded to retain it in a closing condition.

Such an arrangement serves to improve the rigidity of the apparatus.

Preferably the hingable portion of the collapsible strut includes one or more flaps, which may be similar to those on the load supporting members, which flaps may serve to further support the pallets or containers.

Where a strut bears more than one supporting member, the load supporting members are preferably separated on the strut by a distance which is slightly greater than the height of the loaded pallets.

The position and separation of the struts on the platform may be adjustable as also may the positions and therefore the heights of the load supporting members on the strut.

Clearly the maximum numbers of layers of loaded pallets which can be stored is determined by the number of load supporting members on each of the vertical struts. Thus, if each strut bears one supporting member, two layers may be stored; if each strut bears two supporting members, three layers may be stored, and so on.

Typically each load supporting member comprises one or

more flaps which are movable from a generally vertical position into a generally horizontal position to increase the area of support provided thereby. Each flap may be hinged for example by means of a piano type hinge and may be retained in its substantially horizontal position by retaining means such as for example a radial protrusion on its underside, or from one of the hinge members or by protruding lugs on the struts.

Generally the apparatus is installed on a platform which comprises transportation means such as an aircraft, hovercraft, ship or land vehicle (including lorries, trailers, railway wagons and the like). Thus the invention particularly provides apparatus for stacking pallets or containers in transit, on a platform.

The apparatus is particularly suited to installation on the load carrying platform of a land vehicle, particularly the trailer of a side loading vehicle van or lorry unit.

A side loading vehicle fitted with the invention may then be loaded or unloaded from the side, or from the rear. This is a particular advantage in practice, since some loading/unloading facilities only permit the one or the other.

The invention also lies in a method of arranging units such as pallets or containers on a load carrying platform, comprising: positioning a first unit on the platform; positioning at least one movable load supporting member above the first unit in such a manner as to support another unit thereon above the first unit without the weight of the upper unit bearing on the first unit.

This method of arranging units will of course permit a lower unit to be moved or even replaced without moving the upper unit, if required.

The invention also lies in a method of loading a load carrying platform with a plurality of load carrying units such as pallets or containers, such that at least one of the units is supported above at least one other of the units, the latter resting on the platform, by means of movable supporting members, which are movable from a load carrying position in which they extend substantially horizontally above said other unit into a storage position in which they are positioned clear of said other unit.

The load supporting members may be moved so as to extend substantially transversely of the platform or from front to back (or back to front) of the platform when in use.

The invention also lies in a method of unloading a vehicle having a load carrying platform which carries units loaded thereon as aforesaid in at least two independent layers having n units across the width of the platform and m bays along the length of the platform each containing units arranged in l layers (typically l=2), comprising the steps of removing the uppermost layer of n units from the rearmost bay, moving the load supporting members therefor to leave the load carrying region above the next n units in that bay clear, lifting and removing the next n units in that bay, and similarly moving the load supporting members which had supporting those units, until all the units in the rearmost bay have been removed, and thereafter removing the units from each of the remaining (m-1) bays, one layer at a time, in each case moving the load supporting members for the last removed units from

their load carrying position to their storage positions clear of the platform, before removing the next n units.

The load supporting members may be positioned so as to extend transversely across the platform in use or in a direction parallel to the front to back dimension of the platform.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 illustrates part of a vehicle load carrying platform fitted with struts and load supporting members in accordance with the invention, to enable the second layer of load carrying units (eg pallets) to be carried above a lower layer of units;

Figure 2 shows end on a load supporting member which includes hingable flaps for engaging the undersides of the load units (pallets); and

Figure 3 shows part of a vehicle load carrying platform fitted with a modified arrangement of struts and load supporting members, also in accordance with the invention.

#### Detailed Description of the Drawings

As shown in Figure 1, each of the two longer side edges of load carrying platform 10 has fitted therealong a row of vertical struts, arranged in pairs along the length thereof. The struts forming one pair are denoted 12, 14. The inwardly directed faces of these struts carrying load supporting arms 16, 18 which can be folded upwardly for

storage to present a reduced surface area (as shown at 23). However, when required to support a pallet, each relevant flap may be pivoted through 90° about the centre spine 27 of the supporting arm, thereby forming a substantially horizontal surface with an increased surface area which serves to support one edge of the pallet (not shown).

The supporting arms 16, 18 are attached to the vertical struts 12, 14 at one end and at their opposite ends to centrally located collapsible struts 26, 27. The points of attachment to the vertical and collapsible struts can be varied to alter the height of the supporting arms 16, 18 as described.

The collapsible struts are hinged just above these points of attachment to the supporting arms (28 arm strut 26). The hinge point defines the top of the fixed portion of each collapsible strut, the upper part of which 29 (in the case 1) may be rotated downwardly for attachment to the upper end of the fixed part of the next central collapsible strut 30, with the upper part now in a substantially horizontal position. This arrangement improves the rigidity of the apparatus in use, and is shown in dotted outline at 31.

The vertical struts are rotatable about their longitudinal axis. Thus, in order to facilitate loading or unloading from the rear of the platform, each assembly of a vertical strut attached supporting arms and central collapsible strut, may be swung through 90° from a transverse position to a position parallel to the longer sides of the platform. The flaps of the supporting arm may be pivoted together and thereby closed up, so that they do not

project beyond the edge of the platform nor inwardly over the platform and cause an obstruction.

The separation between adjacent vertical struts in a row along each edge is slightly greater than the distance between each edge located vertical strut and the central collapsible strut linked to it via a supporting arm. Thus when the vertical struts are rotated so as to bring the supporting arm in line with the longer edges of the platform, each collapsible central strut can come into alignment with the row of edge located struts.

At the bottom of each collapsible strut is a spring-loaded pin 32 (in the case of strut 26), which can engage with suitably positioned apertures in the platform to lock the collapsible strut in its two positions, either centrally or at an edge of, the platform.

The preferred embodiment thus leaves no obstacle to the rear-loading or rear-unloading of the trailer whilst forming a safety barrier along the sides of the platform.

Figure 2 is an end view of a supporting arm 16 attached to a vertical strut 12 (not shown) and the collapsible strut 26 and comprises two flaps 20, 22 which are rotatable about the central spine 24 of the supporting member. Rotation through an angle greater than  $90^\circ$  is prevented in one direction by the flaps encountering each other and in the other direction by the flaps encountering projections 34, 36 which extend from the sides of the struts 12, 26 so as to engage the undersides of the flaps 20, 22 as shown in Figure 2. The projections may themselves be slidable or portable or otherwise movable to enable them to be positioned below the flaps as shown, or into line with the

edges over the struts, so as not to impede the platform area when not required.

In the arrangement shown in Figure 3, a load carrying platform 50 carries two rows of vertical struts, each row being arranged along the platform 50 in the region of a respective one of the two longer side edges thereof. Each strut in one row forms a pair with an opposed strut in the other row. 52 and 54 denotes the struts of one such pair each of which, as with the struts 12, 14, can be rotated about its respective vertical axis through  $90^\circ$ .

Four movable support arms, such as arms 56, 58, 60 and 62 are mounted on channel section guide posts  $\lambda$ , such as posts 63, 64 and 65, positioned between each pair of vertical struts, and are movable between a horizontal load supporting position, such as is occupied by struts 56 and 58, and a vertical stowed position such as is occupied by the arms 60 and 62. Each arm is mounted on its respective guide post such as the post 64 by means of pins (not shown) extending from opposite sides of the arm into a respective guide in the form of a vertical slot, such as is denoted by 66, in the guide post to which the arm is connected. At the upper end of the slot there is provided an enlarged portion, such as the portion 68, so shaped as to provide a cradle for the pin on the arm. The slot enables the arm to be pivoted from its horizontal position into a vertical position and then vertically lowered into the channel defined by the guide post connected to the arm, so as to reduce the amount of space occupied by the arm when in its stowed position.

The guide posts are arranged in pairs, such as the pair 70 and 72, one of which is positioned against a vertical

strut (for example 52) the other of which is positioned in the central region of the platform 50. Each pair of guide posts are connected by upper and lower transverse arms, for example the arms 74 and 76. It will be seen that, for each pair of struts, eg 52 and 54, there is provided two pairs of guide posts 70, 72, 78 and 80 and four lateral connecting arms 74, 76, 82 and 84.

The arms 74 and 82 extend behind the guide posts 70, 72, 78 and 80 and carry hook connectors, such as connector 86, for engaging an overhanging portion provided by a plate, such as the plate 88, on the outboard end of a load support arm projecting from a guide post between an adjacent pair of struts so as to provide location for the outboard end of the support arm when the arm is horizontal. An example of the engagement between a load bearing arm and such a hook is shown in the case of arm 90, the end of which engages in hook 92 carried by lateral support arm 94. The central guide posts, such as 68 and 70, for each pair of vertical struts flank a central vertical strut, such as strut 96 which is attached to either one of the central guide posts. The guide posts and the central vertical struts are all located on the platform 50 by means of a similar arrangement of pins and apertures (not shown) to that used in the embodiment shown in Figures 1 and 2.

When in their horizontal positions, the load support arms provide support for, for example, a pallet or container, so as to define a second tier of pallets or containers in the vehicle loading bay. In order to facilitate loading or unloading from the rear of the platform (or where a second tier is not required, each load supporting arm can be moved into its vertical stowed position, and the side

struts, such as 52 and 54 rotated about their vertical axis through  $90^{\circ}$  so as to swing the guide posts, the transverse arms and the central posts into a position in which they nest between adjacent struts in the rows along the longer sides of the platform 50. In an alternative embodiment, the central struts such as 96, are not attached to any of the central guide posts, and therefore are not moved as the vertical struts are rotated. Instead, the central struts are removed from the platform 50 after the vertical struts at the side of the platform have been rotated.

Claims

1. Apparatus for installation upon a load carrying platform, the apparatus comprising at least two spaced apart rows of spaced apart substantially vertical struts, having load supporting members thereon which, in use, are positioned substantially horizontally above the platform thereby to support a pallet or container above the platform so as to permit another pallet or container to be carried on the platform therebelow at least part of the weight of the upper pallet or container being borne by the respective strut(s) and which, when not required to support a pallet or container, may be positioned substantially clear of the parts of the platform area over which the supporting members are positioned in use.

2. Apparatus according to claim 1 in which one row of vertical struts is provided along each of two opposed sides of the platform, wherein the struts of one row are substantially directly opposite the struts of the other row.

3. Apparatus according to either claim 1 or claim 2 in which the load supporting members are moveable in such a way that, when not required to support a pallet, the load supporting members can be re-positioned so as substantially not to obstruct movement of any remaining pallets and substantially not to obstruct access to the platform.

4. Apparatus according to claim 3 in which the load supporting members include hingeable flaps, for providing additional area for engaging the underside of the pallets or containers.

5. Apparatus according to any of the preceding claims in which the load supporting members are pivoted upon the vertical struts, such that each supporting member can be swung through substantially a right angle, from a position in which it extends generally transversely across the platform to a position in which it extends generally in line with that row of the vertical struts which includes the respective strut to which that supporting member is attached.

6. Apparatus according to claim 5 in which the rows of struts are arranged along two sides of the platform so that the supporting members can be swung into general alignment with said edges of the platform and with the lines of struts therealong.

7. Apparatus according to any of the preceding claims in which a further row of vertical struts is provided on the platform positioned between said rows of struts to provide further support for the load supporting members.

8. Apparatus according to claim 7 in which two struts in said further row are collapsible.

9. Apparatus according to claim 8 in which the struts in said further row are hinged so that an upper part thereof can be pivoted in a vertical plane, from the vertical, to the horizontal, so as to extend parallel to the platform.

10. Apparatus according to claim 9 in which the hinge point of each strut in said further row is located above the point of attachment of the load supporting member(s) to the strut.

11. Apparatus according to claim 10 in which the separation of the struts in the further row and the length of the hingable portions, are such that the latter will just extend, when horizontal, between one vertical strut and the next in the further row, so as just to make contact with an adjacent strut.

12. Apparatus according to claim 11 in which the hingable portion of each such strut can be retained in the horizontal position by retaining means.

13. Apparatus according to any of the preceding claims in which at least one strut bears more than one supporting member, and said load supporting members are preferably separated on the strut by a distance which is slightly greater than the height to be loaded.

14. Apparatus according to any of the preceding claims in which each load supporting member comprises one or more flaps which are movable from a generally vertical position into a generally horizontal position to increase the area of support provided thereby.

15. A side loading vehicle having a load carrying platform on which apparatus according to any of the preceding claims is installed.

16. Apparatus substantially as described herein with reference to, and as illustrated in Figures 1 and 2 of the

accompanying drawings.

17. Apparatus substantially as described herein with reference to Figure 3 of the accompanying drawings.

18. A method of arranging units such as pallets or containers on a load carrying platform, the method comprising the steps of positioning a first unit on the platform; positioning at least one movable load supporting member above the first unit in such a manner as to support another unit thereon above the first unit without the weight of the upper unit bearing on the first unit.

19. A method of loading a load carrying platform with a plurality of load carrying units such as pallets or containers, such that at least one of the units is supported above at least one other of the units, the latter resting on the platform, by means of movable supporting members, which are movable from a load carrying position in which they extend substantially horizontally above said other unit into a storage position in which they are positioned clear of said other unit.

20. A method of unloading a vehicle having a load carrying platform which carries units loaded thereon as aforesaid in at least two independent layers having n units across the width of the platform and m bays along the length of the platform each containing units arranged in l layers (typically l=2), the method comprising the steps of removing the uppermost layer of n units from the rearmost bay, moving the load supporting members therefor to leave the load carrying region above the next n units in that bay clear, lifting and removing the next n units in that bay, and similarly moving the load supporting

members which had supporting those units, until all the units in the rearmost bay have been removed, and thereafter removing the units from each of the remaining (m-1) bays, one layer at a time, in each case moving the load supporting members for the last removed units from their load carrying position to their storage positions clear of the platform, before removing the next n units.

21. A method substantially as described herein with reference to the accompanying drawings.

Patents Act 1977  
Examiner's report to the Comptroller under Section 17  
(The Search report) - 19 -

Application number  
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Relevant Technical Fields

(i) UK Cl (Ed.M) B7B (BHH, BHL, BHM, BLB, BLC1, BLD);  
B7L (LN/L2A4X)

(ii) Int Cl (Ed.5) B62D

Search Examiner  
K R STRACHAN

Date of completion of Search  
20 APRIL 1994

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASE WPI

Documents considered relevant  
following a search in respect of  
Claims :-  
1 TO 17

Categories of documents

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|---|--|
| <p>X: Document indicating lack of novelty or of inventive step.</p> <p>Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p>A: Document indicating technological background and/or state of the art.</p> | <p>P: Document published on or after the declared priority date but before the filing date of the present application.</p> <p>E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p>&amp;: Member of the same patent family; corresponding document.</p> |
|---|--|

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2253377 A	(CARNTYNE) see Figures 1 and 12. Notice struts 62, load supporting members 14 and 56	1 to 6
X	GB 2166692 A	(PIERPOINT) see Figure 1, page 1 lines 101 to 105. Notice struts 16 and withdrawable load supporting members 24	1 to 3
X	GB 405568	(MELLERSH-JACKSON) see figures. Notice struts B and vertically moveable load supporting members C1, C2	1 to 3
X	US 4695087	(HOLLROCK) see Figures 1 to 4, 9, 10. Notice struts 26a, 28a and load supporting members 16, 18	1 to 6
X	US 3891102	(BLOUNT) see Figures 1, 2, 5. Notice struts 26, 28, 30, 32; hinged load supporting members 22, 24; additional struts 30, 32 with retractable portions 34, 36	1 to 8
X	US 3792894	(AEROQUIP) see Figure 1. Notice struts 26, load supporting members 16a to 16e	1 to 3

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).